



General

Guideline Title

Assessment and management of foot ulcers for people with diabetes.

Bibliographic Source(s)

Registered Nurses' Association of Ontario (RNAO). Assessment and management of foot ulcers for people with diabetes. Toronto (ON): Registered Nurses' Association of Ontario (RNAO); 2013 Mar. 156 p. [223 references]

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Registered Nurses Association of Ontario (RNAO). Assessment and management of foot ulcers for people with diabetes. Toronto (ON): Registered Nurses Association of Ontario (RNAO); 2005 Mar. 112 p.

Recommendations

Major Recommendations

The levels of evidence supporting the recommendations (Ia, Ib, IIa, IIb, III, IV) are defined at the end of the "Major Recommendations" field.

Practice Recommendations

Assessment

Recommendation 1.0

Obtain a comprehensive health history and perform physical examination of affected limb(s).

(Level of Evidence = Ib–IV)

Recommendation 1.1

Identify the location and classification of foot ulcer(s) and measure length, width, and depth of wound bed.

(Level of Evidence = Ia–IV)

Recommendation 1.2

Assess bed of foot ulcer(s) for exudate, odour, condition of peri-ulcer skin and pain.

(Level of Evidence = IV)

Recommendation 1.3

Assess affected limb(s) for vascular supply and facilitate appropriate diagnostic testing, as indicated.

(Level of Evidence = III–IV)

Recommendation 1.4

Assess foot ulcer(s) for infection using clinical assessment techniques, based on signs and symptoms, and facilitate appropriate diagnostic testing, if indicated.

(Level of Evidence = Ia)

Recommendation 1.5

Assess affected limb(s) for sensory, autonomic, and motor changes.

(Level of Evidence = IIa)

Recommendation 1.6

Assess affected limb(s) for elevated foot pressure, structural deformities, ability to exercise, gait abnormality, and ill-fitting footwear and offloading devices.

(Level of Evidence = Ia–IV)

Recommendation 1.7

Document characteristics of foot ulcer(s) after each assessment including location, classification and any abnormal findings.

(Level of Evidence = IV)

Planning

Recommendation 2.0

Determine the potential of the foot ulcer(s) to heal and ensure interventions to optimize healing have been explored.

(Level of Evidence = IV)

Recommendation 2.1

Develop a plan of care incorporating goals mutually agreed upon by the client and health-care professionals to manage diabetic foot ulcer(s).

(Level of Evidence = IV)

Recommendation 2.2

Collaborate with the client/family and interprofessional team to explore other treatment options if healing has not occurred at the expected rate.

(Level of Evidence = IV)

Recommendation 2.3

Collaborate with client/family and the interprofessional team to establish mutually agreed upon goals to improve quality of life if factors affecting poor healing have been addressed and complete wound closure is unlikely.

(Level of Evidence = IV)

Implementation

Recommendation 3.0

Implement a plan of care to mitigate risk factors that can influence wound healing.

(Level of Evidence = IV)

Recommendation 3.1

Provide wound care consisting of debridement, infection control, and moisture balance where appropriate.

(Level of Evidence = Ia–IV)

Recommendation 3.2

Redistribute pressure applied to foot ulcer(s) by the use of offloading devices.

(Level of Evidence = Ia)

Recommendation 3.3

Provide health education to optimize diabetes management, foot care, and ulcer care.

(Level of Evidence = Ia)

Recommendation 3.4

Facilitate client-centred learning based on individual needs to prevent or reduce complications.

(Level of Evidence = III)

Evaluation

Recommendation 4.0

Monitor the progress of wound healing on an ongoing basis using a consistent tool, and evaluate the percentage of wound closure at 4 weeks.

(Level of Evidence = Ib)

Recommendation 4.1

Reassess for additional correctable factors if healing does not occur at the expected rate.

(Level of Evidence = IV)

Education Recommendations

Recommendation 5.0

Health-care professionals participate in continuing education opportunities to enhance specific knowledge and skills to competently assess and manage clients with diabetic foot ulcers, based on the Registered Nurses' Association of Ontario (RNAO) Nursing Best Practice Guideline *Assessment and Management of Foot Ulcers for People with Diabetes (2nd ed.)*.

(Level of Evidence = IV)

Recommendation 5.1

Educational institutions incorporate the RNAO Nursing Best Practice Guideline, *Assessment and Management of Foot Ulcers for People with Diabetes (2nd ed.)*, into basic registered nurse, registered practical nurse, doctor of medicine, and interprofessional curricula to promote a culture of evidence-based practice.

(Level of Evidence = IV)

Organization and Policy Recommendations

Recommendation 6.0

Use a systematic approach to implement the *Assessment and Management of Foot Ulcers for People with Diabetes (2nd ed.)* clinical practice guideline and provide resources and organizational and administrative supports to facilitate clinician uptake.

(Level of Evidence = IV)

Recommendation 6.1

Develop policies that acknowledge and designate human, material and fiscal resources to support the interprofessional team in diabetic foot ulcer management.

(Level of Evidence = IV)

Recommendation 6.2

Establish and support an interprofessional, inter-agency team comprised of knowledgeable and interested persons to address and monitor quality improvement in the management of diabetic foot ulcers.

(Level of Evidence = IV)

Recommendation 6.3

Develop processes to facilitate the referral of clients with diabetic foot ulcers to local diabetes resources and health-care professionals.

(Level of Evidence = IV)

Recommendation 6.4

Advocate for strategies and ongoing funding to assist clients in obtaining appropriate pressure redistribution devices during and after ulcer closure.

(Level of Evidence = IV)

*Note that no new recommendations were developed as a result of the updated systematic review evidence.

Definitions:

Levels of Evidence

Ia Evidence obtained from meta-analysis or systematic review of randomized controlled trials

Ib Evidence obtained from at least one randomized controlled trial

IIa Evidence obtained from at least one well-designed controlled study without randomization

IIb Evidence obtained from at least one other type of well-designed quasi-experimental study, without randomization

III Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies, and case studies

IV Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities

Adapted from "Annex B: Key to evidence statements and grades of recommendations," by the Scottish Intercollegiate Guidelines Network (SIGN), 2012, in *SIGN 50: A Guideline Developer's Handbook*. Available from <http://www.sign.ac.uk/guidelines/fulltext/50/annexoldb.html>

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Diabetic foot ulcers

Guideline Category

Evaluation

Management

Risk Assessment

Clinical Specialty

Dermatology

Endocrinology

Family Practice

Internal Medicine

Nursing

Plastic Surgery

Podiatry

Intended Users

Advanced Practice Nurses

Nurses

Guideline Objective(s)

- To replace the 2005 publication of the Registered Nurses' Association of Ontario (RNAO) Nursing Best Practice Guideline: *Assessment and Management of Foot Ulcers for People with Diabetes*
- To address the question of how to assess and manage people with established diagnosis of diabetic foot ulcer(s)
- To assist all nurses and the interprofessional team to focus on evidence-based strategies to assess and manage people with an established diagnosis of diabetic foot ulcer(s) within the context of the health-care professional-client relationship

Target Population

Patients (≥15 years old) with type 1 and/or type 2 diabetes who have established diabetic foot ulcers

Interventions and Practices Considered

1. Comprehensive health history and physical examination of affected limb
 - Documentation of location and classification of foot ulcer
 - Thorough assessment, including condition of ulcer, vascular supply, signs of infection, changes, functional status, and use of devices
 - Diagnostic testing
2. Plan of care with mutually agreed upon goals
 - Collaboration between client/family and interprofessional team
 - Mitigation of risk factors
3. Wound care (i.e., debridement, infection control, moisture balance), including redistribution of pressure applied to foot ulcer
4. Patient education, including client-centred learning
5. Monitoring progress and reassessment
6. Encouraging professional education and policy implementation

Major Outcomes Considered

- Incidence of foot ulcers and amputation
- Duration of ulceration
- Diabetes-related complications
- Effectiveness of interventions
- Quality of life

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Guideline Review

A member of the Registered Nurses' Association of Ontario (RNAO) guideline development team (project coordinator) searched an established list of websites for guidelines and other relevant content published between 2004 and 2012. This list was compiled based on existing knowledge of evidence-based practice websites and recommendations from the literature. Detailed information about the search strategy for existing guidelines, including the list of websites searched and inclusion criteria, is available online at www.RNAO.ca . Guidelines were also identified by members of the RNAO expert panel. Members of the panel critically appraised nine international guidelines using the Appraisal of Guidelines for Research and Evaluation (AGREE) Instrument II.

Systematic Review

Concurrent with the review of existing guidelines, a search for recent literature relevant to the scope of the guideline was conducted with guidance from the RNAO expert panel chair. The systematic literature search was facilitated by a health sciences librarian. The search, limited to English-language articles published between 2004 and 2012, was applied to Cumulative Index to Nursing and Allied Health (CINAHL), EMBASE, Database of Abstracts of Reviews of Effects (DARE), Medline, Cochrane Central Register of Controlled Trials and Cochrane Database of Systematic Reviews.

A systematic review of the evidence based on the scope of the original guideline and supported by four clinical questions was conducted to capture the relevant literature and guidelines published between 2004 and 2012.

Two research assistants (Master's prepared nurses) independently assessed the eligibility of studies according to established inclusion/exclusion criteria. The RNAO Best Practice Guideline (BPG) Program Manager involved in supporting the RNAO expert panel resolved disagreements.

Detailed information about the search strategy for the systematic review, including the inclusion and exclusion criteria as well as search terms, is available online at www.RNAO.ca .

Number of Source Documents

34 studies and 4 guidelines were included.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Levels of Evidence

Ia Evidence obtained from meta-analysis or systematic review of randomized controlled trials

Ib Evidence obtained from at least one randomized controlled trial

IIa Evidence obtained from at least one well-designed controlled study without randomization

IIb Evidence obtained from at least one other type of well-designed quasi-experimental study, without randomization

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Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Quality appraisal scores for 17 articles (a random sample of 10% of articles eligible for data extraction and quality appraisal) were independently assessed by the Registered Nurses' Association of Ontario (RNAO) Best Practice Guidelines (BPG) Program Research Assistants. Strong inter-rater agreement (kappa statistic, $K=0.67$) justified proceeding with quality appraisal and data extraction by dividing the remaining studies equally between the two RNAO BPG Program Research Associates. A final summary of literature findings was completed. The comprehensive data tables and summary were provided to all panel members.

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

For this edition of the guideline, the Registered Nurses' Association of Ontario (RNAO) assembled an expert panel of health-care professionals comprised of members from the previous development panel as well as other recommended individuals with particular expertise in this practice area.

The RNAO expert panel members were given a mandate to review the original guideline (March 2005) in light of the new evidence, specifically to ensure the validity, appropriateness and safety of the guideline recommendations. Where necessary, sections of the guideline have been updated based on new evidence. This current edition (2013) is the culmination of the RNAO expert panel's work in integrating the most current and best evidence to update the guideline recommendations and supporting evidence from the first edition.

In September 2012, the RNAO expert panel convened to achieve consensus on the need to update the original guideline recommendations and discussion of evidence. A review of the most recent literature and relevant guidelines published between 2004 and 2012 resulted in refinements to existing recommendations, as well as inclusion of stronger evidence for the recommendations. This second edition of the guideline is a culmination of the original work and the new literature.

The following research questions were established to guide the systematic review:

1. What are the most effective methods for the assessment of foot ulcer in clients with diabetes?
2. What are the most effective interventions to manage foot ulcers and prevent re-ulceration in clients with diabetes?
3. What health-care professional education and training is required to ensure the provision of effective diabetic foot ulcer care?
4. How do health-care organizations support and promote optimal assessment and management of foot ulcers in clients with diabetes?

Rating Scheme for the Strength of the Recommendations

Not applicable

Cost Analysis

The guideline developers reviewed published cost analyses.

Method of Guideline Validation

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

Stakeholders representing diverse perspectives were solicited for their feedback.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Accurate and adequate assessment and management of foot ulcers for people with diabetes

Potential Harms

- In persons with diabetes, ankle-brachial pressure index (ABPI) results can be unreliable (falsely negative) due to calcification of the arterial vessels.
- Sharp debridement is a high-risk procedure and should be undertaken with caution. It is a procedure that must only be performed by trained and experienced health-care professionals, within the policies of the organization.
- Performing a procedure below the dermis is a controlled act that must be carried out by an authorized health-care professional. Health-care professionals should be aware of their professional scope of practice as well as the policies and procedures within their organization.
- Application of moisture retentive dressings in the presence of ischemia and/or dry gangrene can result in a serious limb-threatening infection.

See Appendices Q and R in the original guideline document for cautions for topical medications and dressings used to treat diabetic foot ulcers.

Contraindications

Contraindications

Diagnosing magnetic resonance angiography (MRA) is contraindicated for persons with metal foreign implants (i.e., pacemaker, aneurism clips, orthopedic screws, pin, etc.).

See Appendix R in the original guideline document for contraindications to dressings used in the treatment of diabetic foot ulcers.

Qualifying Statements

Qualifying Statements

- These guidelines are not binding on nurses or the organizations that employ them. The use of these guidelines should be flexible, and based on individual needs and local circumstances. They neither constitute a liability nor discharge from liability. While every effort has been made to ensure the accuracy of the contents at the time of publication, neither the authors nor the Registered Nurses' Association of Ontario (RNAO) give any guarantee as to the accuracy of the information contained in them nor accept any liability, with respect to loss, damage, injury or expense arising from any such errors or omission in the contents of this work.
- This nursing best practice guideline is a comprehensive document that provides resources necessary for the support of evidence-based nursing practice. The document needs to be reviewed and applied, based on the specific needs of the organization or practice setting/environment, as well as the needs and wishes of the client. This guideline should be applied as a tool or template that is intended to enhance decision making in the provision of individualized care. In addition, the guideline provides an overview of appropriate structures and supports necessary for the provision of the best possible evidence-based care.
- Nurses, other health-care professionals and administrators who lead and facilitate practice changes will find this document invaluable for the development of policies, procedures, protocols, educational programs and assessments, interventions and documentation tools. Nurses providing direct care will benefit from reviewing the recommendations, the evidence in support of the recommendations and the process that was used to develop this edition of the guideline. However, it is highly recommended that practice settings/environments adapt these guidelines in formats that would be user-friendly for daily use. This guideline has some suggested formats for local adaptation and tailoring.

Implementation of the Guideline

Description of Implementation Strategy

Toolkit: Implementing Clinical Practice Guidelines

Best practice guidelines (BPGs) can only be successfully implemented if there are adequate planning, resources, organizational and administrative supports, as well as appropriate facilitation. In this light, the Registered Nurses' Association of Ontario (RNAO), through a panel of nurses, researchers and administrators, has developed the *Toolkit: Implementation of Best Practice Guidelines* (2012). The *Toolkit* is based on available evidence, theoretical perspectives and consensus. The *Toolkit* is recommended for guiding the implementation of any clinical practice guideline in a health-care organization.

The *Toolkit* provides step-by-step directions to individuals and groups involved in planning, coordinating and facilitating the guideline implementation. These steps reflect a process that is dynamic and iterative rather than linear. Therefore, at each phase, preparation for the next phases and reflection on the previous phase is essential. Specifically, the *Toolkit* addresses the following key steps, as illustrated in the "Knowledge to Action" framework when implementing a guideline:

1. Identify problem: identify, review, select knowledge (Best Practice Guideline).
2. Adapt knowledge to local context:
 - Assess barriers and facilitators to knowledge use
 - Identify resources
3. Select, tailor and implement interventions.

4. Monitor knowledge use.
5. Evaluate outcomes.
6. Sustain knowledge use.

Implementing guidelines that result in successful practice changes and positive clinical impact is a complex undertaking. The *Toolkit* is a key resource for managing this process and can be downloaded at <http://rnao.ca/bpg> (see also the "Availability of Companion Documents" field).

Evaluation/Monitoring of Guideline

Organizations implementing the recommendations in this nursing BPG are advised to consider how their implementation, and their impact, will be monitored and evaluated. The impact of BPG implementation and sustained use of evidence-based practice can be evaluated objectively through regular review of the utilization of the Nursing Order Sets and their effect on client health outcomes. Nursing Order Sets embedded within clinical information systems simplify this process by providing a mechanism for electronic data capture.

Table 8 in the original guideline document is based on a framework outlined in the *Toolkit: Implementation of best practice guidelines* (2012) and illustrates some specific indicators for monitoring and evaluation of the RNAO guideline *Assessment and Management of Foot Ulcers for People with Diabetes* (2nd ed).

Implementation Strategies

Guideline implementation at the point of care is multifaceted and challenging at all levels. The uptake of knowledge in any practice setting requires more than the awareness and distribution of guidelines. Application of the guideline in any practice setting requires adaptation for the local context. Adaptation must be systematic and participatory to ensure recommendations are customized to fit the local context. The RNAO recommends the use of the *Toolkit: Implementation of Best Practice Guidelines* (2012), which provides an evidenced-informed process for a systematic, well-planned implementation.

The *Toolkit* is based on emerging evidence that the likelihood of achieving successful uptake of best practice in health care increases when:

- Leaders at all levels are committed to support facilitation of guideline implementation
- Guidelines are selected for implementation through a systematic, participatory process
- Stakeholders relevant to the focus of the guideline are identified, and engaged in the implementation process
- An environmental readiness assessment for implementation is conducted for its impact on guideline uptake
- The guideline is tailored to the local context
- Barriers and facilitators to use of the guideline are assessed and addressed
- Interventions are selected that promote guideline use
- Guideline use is systematically monitored and sustained
- Evaluation of the impacts of guideline use is embedded into the process
- There are adequate resources to complete the activities related to all aspects of guideline implementation

The *Toolkit* uses the knowledge-to-action model that depicts the process of choosing a guideline in the centre triangle, and follows a detailed step-by-step direction for implementing guideline recommendations at the local level. These steps are illustrated in Figure 3 in the original guideline document: "Knowledge to Action" framework.

Implementation Tools

Chart Documentation/Checklists/Forms

Foreign Language Translations

Mobile Device Resources

Patient Resources

Slide Presentation

Tool Kits

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Living with Illness

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

Registered Nurses' Association of Ontario (RNAO). Assessment and management of foot ulcers for people with diabetes. Toronto (ON): Registered Nurses' Association of Ontario (RNAO); 2013 Mar. 156 p. [223 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2005 Mar (revised 2013 Mar)

Guideline Developer(s)

Registered Nurses' Association of Ontario - Professional Association

Source(s) of Funding

Funding was provided by the Ontario Ministry of Health and Long-Term Care.

Guideline Committee

Guideline Development Panel

Composition of Group That Authored the Guideline

Development Panel Members

Laura M. Teague, RN, MN, NP

Panel Chair

Nurse Practitioner, St. Michael's Hospital
Lecturer, University of Toronto, Faculty of Nursing
Adjunct Faculty, Western University – Faculty of Physical Therapy
(Master of Clinical Science, Wound Healing)
Toronto, Ontario

Karen Bruton, RN, BScN, CETN(C)
Professional Practice Leader
Northumberland Hills Hospital
Cobourg, Ontario

Patricia Coutts, RN
Wound Care Specialist and Clinical Trials Coordinator
Dermatology Office of Dr. R. Gary Sibbald
Mississauga, Ontario

Laurie Goodman, RN, BA, MHScN
Advanced Practice Nurse/Educator
Toronto Regional Wound Healing Clinic
CoDirector & Course Coordinator IIWCC-CAN
Mississauga, Ontario

Christine A. Murphy, RN, CETN(C), BSc (Hons), MCIScWH, PhD (cand).
Enterostomal Therapist, The Ottawa Hospital
Adjunct Faculty, Western University
(Master of Clinical Sciences, Wound Healing)
Ottawa, Ontario

Heather Nesbeth, RN, BSN, CDE
Diabetes Educator
Trillium Health Centre – Diabetes Centre
Toronto, Ontario

Deirdre O'Sullivan-Drombolis, BScPT, MCISc PT (Wound Healing)
Physical Therapist, Wound Resource, Riverside Health Care Facilities
Adjunct Faculty, Western University
(Master of Clinical Sciences, Wound Healing)
Adjunct Faculty, Northern Ontario School of Medicine
Fort Frances, Ontario

Ruth Thompson, DCh, MCISC-WH
Chiropodist
The Ottawa Hospital
Ottawa, Ontario

Financial Disclosures/Conflicts of Interest

Declarations of interest and confidentiality were made by all members of the guideline development panel. Further details are available from the Registered Nurses' Association of Ontario.

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Registered Nurses Association of Ontario (RNAO). Assessment and management of foot ulcers for

people with diabetes. Toronto (ON): Registered Nurses Association of Ontario (RNAO); 2005 Mar. 112 p.

Guideline Availability

Electronic copies: Available in English, French, Italian and Spanish from the [Registered Nurses Association of Ontario \(RNAO\) Web site](#) .

Print copies: Available from the Registered Nurses Association of Ontario (RNAO), Nursing Best Practice Guidelines Project, 158 Pearl Street, Toronto, Ontario M5H 1L3.

Availability of Companion Documents

The following are available:

- Webinar: evaluating outcomes through guideline-based indicators. Toronto (ON): Registered Nurses Association of Ontario (RNAO); 2013 Aug. 54 p. Electronic copies: Available in Portable Document Format (PDF) from the [Registered Nurses Association of Ontario \(RNAO\) Web site](#) .
- Toolkit: implementation of clinical practice guidelines. Toronto (ON): Registered Nurses' Association of Ontario (RNAO); 2012 Sep. 154 p. Electronic copies: Available in PDF from the [RNAO Web site](#) .
- Registered Nurses' Association of Ontario – Nursing Best Practice Guidelines Program assessment and management of foot ulcers for people with diabetes-second edition-March 2013. Toronto (ON): Registered Nurses Association of Ontario (RNAO); 2013 Mar. 5 p. Electronic copies: Available in PDF from the [RNAO Web site](#) .
- Sustainability of best practice guideline implementation. Toronto (ON): Registered Nurses' Association of Ontario (RNAO); 24 p. Electronic copies: Available in PDF and as a power point presentation from the [RNAO Web site](#) .
- Educator's resource: integration of best practice guidelines. Toronto (ON): Registered Nurses' Association of Ontario (RNAO); 2005 Jun. 123 p. Electronic copies: Available in PDF from the [RNAO Web site](#) .

Print copies: Available from the Registered Nurses Association of Ontario (RNAO), Nursing Best Practice Guidelines Project, 158 Pearl Street, Toronto, Ontario M5H 1L3.

The appendices of the [original guideline document](#) contain resources including a guide to dressing foot wounds, a clinic assessment tool, a debridement decision-making algorithm, the PEDIS diabetic foot ulcer classification system, and the Pressure Ulcer Scale for Healing (PUSH) Tool 3.0.

Mobile versions of RNAO guidelines are available from the [RNAO Web site](#) .

Patient Resources

The following is available:

- Managing foot ulcers in people with diabetes. Health education fact sheet. Toronto (ON): Registered Nurses' Association of Ontario (RNAO); 2 p. Electronic copies: Available in Portable Document Format (PDF) from the [Registered Nurses' Association of Ontario \(RNAO\) Web site](#) .

In addition, "Diabetes, Healthy Feet and You," a patient brochure, is available in Appendix S of the [original guideline document](#) .

Print copies: Available from the Registered Nurses' Association of Ontario (RNAO), Nursing Best Practice Guidelines Project, 158 Pearl Street, Toronto, Ontario M5H 1L3.

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them better understand their health and their diagnosed disorders. By providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors

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NGC Status

This summary was completed by ECRI on June 3, 2005. The updated information was verified by the guideline developer on June 21, 2005. This NGC summary was updated by ECRI Institute on March 20, 2014.

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